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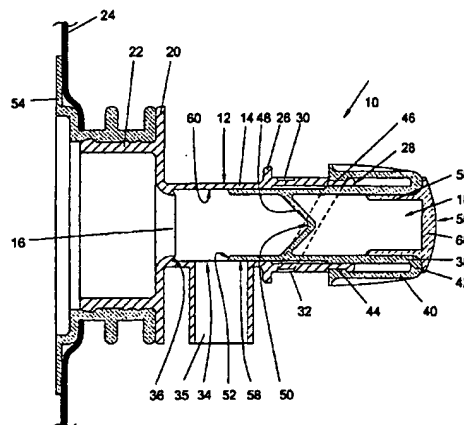
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(54) Title: TAPS FOR LIQUID FLOW CONTROL



(57) Abstract: A tap for controlling liquid flow from a bag (24) contained in an outer box is disclosed. It includes a cylindrical barrel (12) having a tube (14) with an inlet end (16), a seat (36) formed at the inlet end (16) and an outlet (34). The outlet (34) serves as an outlet from the barrel (12). The inlet end (16) and the outlet (34) are located on opposite sides of the seat (36). The tap further includes a plunger knob (38), which is sealingly slidably movable in the tube (14). The plunger knob (38) is integrally formed with a circumferential skirt (40) slidably fitting over the outside of the tube (14). During use the plunger knob (38) is displaceable internally along the tube (14) whereby a circumferential sealing edge (52) moves across the outlet (34) from a closed position, in which the sealing edge (52) is in engagement with the seat (36) to close off the inlet end (16) from the outlet (34), into an open position in which the sealing edge (52) is spaced away from the seat (36) to permit liquid flow through the inlet end (16) to the outlet (34). For closure of the outlet (34) the reverse procedure takes place whereby the plunger knob (38) is moved back into the closed position.

## TAPS FOR LIQUID FLOW CONTROL.

### FIELD OF INVENTION

This invention relates to taps for controlling liquid flow.

### BACKGROUND TO INVENTION

- 5 The so-called "bag-in-box" containers are widely used to package wine, fruit juices and other liquids. The liquid is contained in a flexible pouch of plastics material and the pouch is placed into a cardboard box.

A tap is provided for opening the pouch and enabling controlled amounts of liquid to be dispensed. The entire tap can be secured to the pouch.

- 10 Alternatively, a gasket or flange can be secured to the pouch and the tap can be placed loose in the cardboard box.

The tap should be simple in construction and inexpensive to make. It should not leak or drip and must not permit ingress of air into the bag.

- 15 It is an object of the present invention to provide a tap which meets the conditions set out above more successfully than other known taps.

### SUMMARY OF INVENTION

- According to the invention, a tap including a cylindrical barrel having a tube with an inlet end, a seat formed at the inlet end of the tube, an outlet located in the tube, which outlet serves as an outlet from the barrel, the inlet end and  
20 the outlet being located on opposite sides of the seat, is characterised thereby that it includes a plunger knob, which is sealingly slidably movable in the tube, the plunger knob being integrally formed with a circumferential skirt slidably fitting over the outside of the tube.

The plunger knob may be displaceable internally along the tube in that a circumferential sealing edge moves across the outlet from between a first or closed position, in which the sealing edge of the plunger knob is in engagement with the seat to close off the inlet end from the outlet, into a  
5 second or open position in which the sealing edge is spaced away from the seat to permit liquid flow through the inlet end to and through the outlet, and for closure of the outlet the reverse procedure taking place to cause the plunger knob to be moved back into the first or closed position.

Also according to the invention a tap including a cylindrical barrel having a  
10 tube with opposite open ends, one of the open ends forming an inlet end, a seat formed at the inlet end of the tube, an outlet located in the tube between its open ends, which outlet serves as an outlet from the barrel, the inlet end and the outlet being located on opposite sides of the seat, is characterised thereby that it includes a hollow cylindrical plunger knob,  
15 which is sealingly slidably movable along the tube internally thereof, the plunger knob having an inner wall closing off the one end from the opposite end of the tube, and being integrally formed with a circumferential skirt slidably fitting over the outside of the tube so that during use the plunger knob is displaceable internally along the tube in that a circumferential  
20 sealing edge moves across the outlet from between a first or closed position, in which the sealing edge of the plunger knob is in engagement with the seat to close off the inlet end from the outlet, into a second or open position in which the sealing edge is spaced away from the seat to permit liquid flow through the inlet end to and through the outlet, and for closure of the outlet  
25 the reverse procedure taking place to cause the plunger knob to be moved back into the first or closed position.

The tap may include guiding means for rotatably guiding the plunger knob along a spiral path.

The guiding means may include at least one spiral groove in the tube, and the plunger knob may include one or more protrusions respectively slidingly  
5 engaged in the spiral groove(s).

A spout may be provided at the outlet.

### **BRIEF DESCRIPTION OF DRAWINGS**

The invention will now be described by way of example with reference to the accompanying schematic drawings.

10 In the drawings there is shown in:

Figure 1 a sectional view through a tap in accordance with the invention, the tap being shown in its closed condition;

Figure 2 a view corresponding to Figure 1 but showing the tap in the open position; and

15 Figure 3 a sectional view through a knob operatively joined to the tap shown in Figure 1 and closed off by way of a closure cap.

### **DETAILED DESCRIPTION OF DRAWINGS**

Referring to Figure 1, a tap in accordance with the invention, generally indicated by reference numeral 10, is shown. The tap 10 includes a hollow  
20 tubular body or barrel 12 having a cylindrical tube 14 with opposite open ends 16 and 18 and being integrally formed with a disc-like flange 20 and sleeve 22 at one end. The sleeve 22 is of larger diameter than the cylindrical tube 14 of the body 12 and protrudes from the flange 20 opposite

to the tube 14 of the body 12. The sleeve 22 is in push-fit with a pouch 24 as will be described below. A circular collar 26 protrudes from the tube 14 approximately midway along its length.

Between the collar 26 and the outer end 28 of the tube 14, furthest from the  
5 flange 20, there is, in the outer face of the tube 14, a double start spiral groove 30 and 32. Each groove 30, 32 extends through approximately 180°, i.e. a half turn over its full extent. The spiral grooves 30, 32 start near the collar 26 and terminate just short of the outer end 28 of the tube 14.

An outlet 34 is provided in the tube 14 between the collar 26 and the flange  
10 20. A spout 35 is provided at the outlet 34. This spout 35 is optional and need not be provided so that only the outlet 34 is present. The body 12 further includes an inclined valve seat 36 near the flange 20. The valve seat 36 will be described in more detail hereinafter.

Through the open end 18 of the body 12 a plunger knob 38 is fitted onto the  
15 tube 14. The plunger knob 38 includes an outer skirt 40, and a radially transverse end wall 42. The skirt 40 has two radially inwardly directed protrusions 44, 46 on the inner face thereof. The protrusions 44, 46 are respectively slidably located in the grooves 30, 32.

The plunger knob 38 is of generally round cylindrical form and midway along  
20 its length it is closed by a transverse inner wall 48. The wall 48 has a conical recess 50 on its side facing towards the open end 16. The plunger knob 38, at its end facing the open end 16 of the body 12, is provided with a conically inclined sealing edge 52. The edge 52 of the plunger 38 lies at an angle, which has been designated by " $\alpha$ " in Figure 3. The valve seat 36 also  
25 has an associated conically inclined edge of which the angle relative to the inner surface of the tube 14 is at an identical angle " $\alpha$ ".

The tap 10 described above is primarily intended for use with a so-called "bag-in-a-box" liquid containers. In such containers, the liquid to be dispensed is contained within a pouch of plastics material (the pouch being indicated by reference numeral 24 in the drawings). One of the walls of the  
5 pouch 24 has a circular hole punched in it and a sleeve-like collar 54 is welded to the pouch 24 in register with the hole. The connection between the collar 54 and the pouch 24 prevents any leakage between them.

A closure cap 56, having a cylinder 58 and an end wall 60, is fitted to the open end into the plunger knob 38 so as to close it off.

10 When the tap is closed, as shown in Figure 1, the sleeve 22 and a part of the body 12 from the wall 48 towards the pouch 24 are filled with liquid, being in communication by way of its open end 16 with the interior of the pouch 24. When the plunger knob 38 is rotated in an anti-clockwise direction from the position illustrated in Figure 1, into the position shown in  
15 Figure 2, axial movement thereof occurs in addition to the turning movement due to sliding co-operation between the grooves 30, 32 and the protrusions 44, 46. The plunger knob 38 is shifted away from the valve seat 36 towards the right. The sealing edge 52 of the plunger knob 38 thus separates from the valve seat 36 until the plunger knob 38 uncovers the outlet 34 to come in  
20 communication with the interior of the pouch 24. The plunger knob 38 is now in an open position (Figure 2) and flow of liquid occurs through the opening 16 into the outlet 34 and through the spout 35 out of the tap 10.

When the plunger knob 38 is rotated in a clockwise direction, it is moved towards the flange 20 into the position shown in Figure 1. As the edge 52 of  
25 the plunger knob 38 moves past the outlet 34, the outlet 34 is closed and there is a wiping action which minimises the possibility of the tap 10 dripping after it has been closed. Thereafter, eventually the edge 52 re-engages the

valve seat 36 to close outflow of liquid through the outlet 34 and the spout 35 entirely.

As the sealing edge 52 and the valve seat 36 are urged into contact during rotation of the plunger knob 38 towards the closed position of the tap 10, the valve seat 36 tends to deflect the plunger knob 38 and thereby its outer cylindrical surface 58 outwardly into engagement with the cylindrical inner face 60 of the tube 14. This is caused by the required resiliency of the plastics material used to produce the body 12 and the plunger knob 38. Thus there are two seals in action between the interior of the pouch 24 and the outlet 34. The first seal exists where the sealing edge 52 and the valve seat 36 are in engagement, and the second seal exists where the cylindrical outer surface 58 of the plunger knob 38 bears on the cylindrical inner surface 60 of the tube 14.

The portion of the grooves 30, 32, which are closest to the collar 26, can be of lesser pitch than the remaining portions of the grooves 30, 32 or can extend circumferentially for a short distance. Thus there is little or no tendency for the plunger knob 38 to rotate from the position it is left in when the tap 10 is fully closed as is shown in Figure 1.

If desired, the sealing edge 52 and the valve seat 36 can be in engagement before the plunger knob 38 has rotated to its furthest clockwise direction.

The two-start grooves 30, 32 can be replaced by a single-start groove or by a groove having more than two starts.

There is at all times contact between the plunger knob 38 and the tube 14 due to the tight sealing fit of the plunger knob 38 and the tube 14. As explained above, the slidable sealing fit of the plunger knob 38 in the tube 14, and the length over which these components contact, forms a seal such

that there is little prospect of leakage between the plunger knob 38 and the body 12. This seal is also effectively minimises leakage when the tap is open.

This invention provides for a tap 10 having the following characteristics,  
5 advantages and properties:

1. Positive valve seat to prevent leakage and oxygen transmission.
2. No stagnation takes place in the area that is in contact with the product.
3. There is completely unrestricted flow.
4. The spiral movement of the plunger 38 across the outlet 34 ensures drip-  
10 free cut off.
5. The diaphragm action of the cap ensures constant pressure on the valve seat.



## CLAIMS

1. A tap which includes a cylindrical barrel (12) having a tube (14) with an inlet end (16), a seat (36) formed at the inlet end (16) of the tube (14), an outlet (34) located in the tube (14), which outlet (34) serves as an outlet  
5 from the barrel (12), the inlet end (16) and the outlet (34) being located on opposite sides of the seat (36), characterised thereby that it includes a plunger knob (38), which is sealingly slidably movable in the tube (14), the plunger knob (38) being integrally formed with a circumferential skirt (40) slidably fitting over the outside of the tube (14).
- 10 2. A tap as claimed in claim 1, characterised thereby that the plunger knob (38) is displaceable internally along the tube (14) in that a circumferential sealing edge (52) moves across the outlet (34) from between a first or closed position (Figure 1), in which the sealing edge (52) of the plunger knob (38) is in engagement with the seat (36) to close off the inlet end  
15 (16) from the outlet (34), into a second or open position (Figure 2) in which the sealing edge (52) is spaced away from the seat (36) to permit liquid flow through the inlet end (16) to and through the outlet (34), and for closure of the outlet (34) the reverse procedure taking place to cause the plunger knob (38) to be moved back into the first or closed position  
20 (Figure 1).
3. A tap as claimed in claim 2, characterised thereby that it includes guiding means (30, 32, 44, 46) for rotatably guiding the plunger knob (38) along a spiral path.
4. A tap as claimed in claim 3, characterised thereby that the guiding means  
25 includes at least one spiral groove (30, 32) in the tube (14), and the

plunger knob (38) includes one or more protrusions (44, 46) respectively slidingly engaged in the spiral groove(s) (30, 32).

- 5 5. A tap which includes a cylindrical barrel (12) having a tube (14) with opposite open ends (16, 18), one of the open ends forming an inlet end (16), a seat (36) formed at the inlet end (16) of the tube (14), an outlet (34) located in the tube (14) between its open ends (16, 18), which outlet (34) serves as an outlet from the barrel (12), the inlet end (16) and the outlet (34) being located on opposite sides of the seat (36), characterised thereby that it includes a hollow cylindrical plunger knob (38), which is
- 10 sealingly slidably movable along the tube (14) internally thereof, the plunger knob (38) having an inner wall (48) closing off the one end (16) from the opposite end (18) of the tube (14), and being integrally formed with a circumferential skirt (40) slidably fitting over the outside of the tube (14) so that during use the plunger knob (38) is displaceable internally
- 15 along the tube (14) in that a circumferential sealing edge (52) moves across the outlet (34) from between a first or closed position (Figure 1), in which the sealing edge (52) of the plunger knob (38) is in engagement with the seat (36) to close off the inlet end (16) from the outlet (34), into a second or open position (Figure 2) in which the sealing edge (52) is
- 20 spaced away from the seat (36) to permit liquid flow through the inlet end (16) to and through the outlet (34), and for closure of the outlet (34) the reverse procedure taking place to cause the plunger knob (38) to be moved back into the first or closed position (Figure 1).
- 25 6. A tap as claimed in claim 5, characterised thereby that it includes guiding means (30, 32, 44, 46) for rotatably guiding the plunger knob (38) along a spiral path.

7. A tap as claimed in claim 6, characterised thereby that the guiding means includes at least one spiral groove (30, 32) in the tube (14), and the plunger knob (38) includes one or more protrusions (44, 46) respectively slidingly engaged in the spiral groove(s) (30, 32).
- 5 8. A tap as claimed in any one of the preceding claims, characterised thereby that a spout (35) is provided at the outlet (34).



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FIG. 2

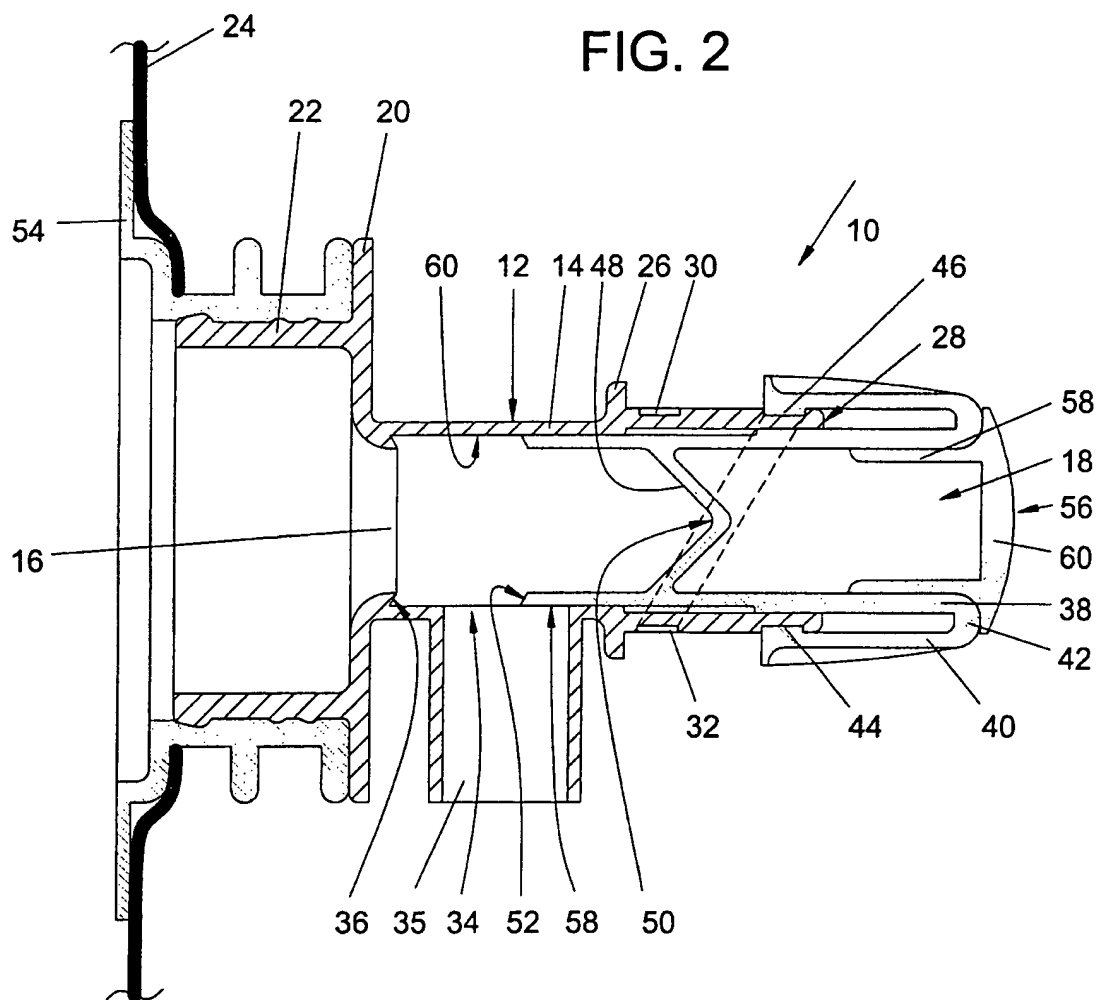
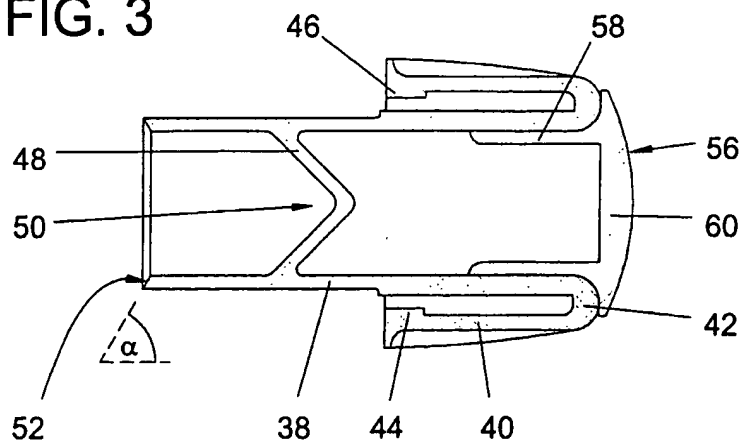


FIG. 3



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IB00/00907

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
Int. Cl. <sup>7</sup> : B67D 3/04, F16K 1/04		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) IPC: B67D 3/04		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DWPI: B67D 3/04, skirt, sleeve, bag, pouch, bladder, plunger, stem		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	AU 40418/85 A (MARLEY TECHNICAL PRODUCTS (PROPRIETARY) LIMITED) 10 October 1985	
X	See whole document, particularly figure 1	1-8
Y	See whole document, particularly figure 1	1-8
	EP 272906 A (WADDINGTON & DUVAL LIMITED) 29 June 1988	
X	See whole document, particularly figure 2	1-8
	GB 1130259 A (WM. ARNEMANN MASCHINENFABRIK) 16 October 1968	
X	See whole document, particularly figures 1, 2	1-4, 8
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex		
<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>		
Date of the actual completion of the international search 26 September 2000		Date of mailing of the international search report - 4 OCT 2000
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929		Authorized officer  DEREK BUTLER Telephone No : (02) 6283 2347

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB00/00907

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 386332 A (SIEGER PLASTIC GmbH) 12 September 1990 See whole document	1, 8
X	WO 8503062 A (DIEMOULDERS PROPRIETARY LIMITED) 18 July 1985 See whole document	1, 8
X	US 4976381 A (SCHOLLE et al) 11 December 1990 See whole document	1, 8
Y	See whole document	1-8
Y	US 4619377 A (ROOS) 28 October 1986 See whole document	1-8

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
**PCT/IB00/00907**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
AU	40418/85	CA	1239618	EP	171870	GR	850830
		JP	61011360	PT	80225	ZA	8502267
EP	272906	AU	82696/87	GB	2200724	JP	63162468
		ZA	8709506				
GB	1130259	DE	1482672				
EP	386332	NIL					
WO	8503062	AU	37853/85	BR	8407258	DK	3967/85
		EP	170660	FI	853348	IT	1196382
		NO	853428	PT	79796	ZA	8500037
US	4976381	AU	50203/90	CA	2025352	EP	407556
		WO	9008098	US	5118015		
US	4619377	AU	26010/84	BR	8401453	CA	1206924
		EP	124268	ES	531123	IL	71329
		NZ	207690	PT	78336	ZA	8401992
END OF ANNEX							